

Article

Pope John Paul II and the neurological standard for the determination of death: A critical analysis of his address to the Transplantation Society

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The introduction of the “brain death” criterion constitutes a significant paradigm shift in the determination of death. The perception of the public at large is that the Catholic Church has formally endorsed this neurological standard. However, a critical reading of the only magisterial document on this subject, Pope John Paul II’s 2000 address, shows that the pope’s acceptance of the neurological criterion is conditional in that it entails a twofold requirement. It requires that certain medical presuppositions of the neurological standard are fulfilled, and that its philosophical premise coheres with the Church’s teaching on the body–soul union. This article demonstrates that the medical presuppositions are not fulfilled, and that the doctrine of the brain as the central somatic integrator of the body does not cohere either with the current holistic understanding of the human organism or with the Church’s Thomistic doctrine of the soul as the form of the body.

Summary: The concept of “brain death” (the neurological basis for legally declaring a person dead) has caused much controversy since its inception. In this regard, it has been generally perceived that the Catholic Church has officially affirmed the “brain death” criterion. The address of Pope John Paul II in 2000 shows, however, that he only gave it a conditional acceptance, one which requires that several medical and philosophical presuppositions of the “brain death” standard be fulfilled. This article demonstrates, taking into consideration both the empirical evidence and the Church’s Thomistic anthropology, that the presuppositions have not been fulfilled.

Keywords: Brain death, Papal allocutions, Hylomorphism, Principle of integration, Soul, Anti-entropic principle

INTRODUCTION

Since the 1968 publication of the Harvard report introducing the “brain death” standard as the new medical definition of death, the controversy over this criterion has remained unabated despite the intervention of state legislatures and authoritative bodies to grandfather the “brain

death” paradigm into public acceptance and to dampen the intensity of the debate at the level of society at large.¹ The ongoing case of Jahi McMath has brought the controversy to public attention again, however.²

The “brain death” controversy has caused divisions not only within secular academia but also among Catholics,

including the ordained, especially those holding high ecclesiastical offices. As a group, Catholics opposing the “brain death” paradigm are in the minority.³ In contrast, not a few Catholics supporters of “brain death” occupy prominent positions in the Church, such that their publications, coming from a level of authority, give the impression that the “brain death” standard has been “given the stamp of approval of the Roman Catholic Church” (Lock 2004, 137; see, also, Eberl 2015, 235).⁴ However, these documents do not contain magisterial authority; they remain only opinions/suggestions advanced by scholars working with and for the Magisterium.

The crucial question is thus, “has the Catholic Church indeed formally endorsed brain death as death?” The magisterial document that touches on the neurological standard is the address of the Holy Father John Paul II to the 18th International Congress of the Transplantation Society in August 2000. It has been hailed by Catholic “brain death” defenders as the indication that the Church has “indeed give[n] definitive approval to the use of neurological criteria for the determination of death” (Furton 2002, 455; see, also, Diamond 2007, 492; Haas 2011, 279; Eberl 2015, 235). However, a critical reading of this rather synthetic document should take into account other papal pronouncements on the issues of death and organ transplantation, and also the premises (medical and philosophical) embedded in the document itself. These seem to have been overlooked by most commentators as they focused mainly on the third paragraph of article 5 of the address.

Thus, in order to answer the aforementioned question, whether indeed the Church, through her magisterial teaching, has *fully* endorsed the “brain death” standard, the purpose of this essay is to re-read critically John Paul II’s August 2000 address, unpacking and analyzing the

premises contained therein. In this way, it will be demonstrated that the so-called “definitive approval” is only a conditional approval pending the fulfillment of several specific presuppositions or conditions. As will be shown, these presuppositions have not been met whether on the empirical-practical level or on the philosophical-anthropological level. Since the pope’s address was about both organ transplantation and the use of the neurological standard for the determination of death, the essay will begin with a brief account of the genesis of “brain death” (less known or inaccessible to the public), which sheds light on the motivating reasons for the introduction of the “brain death” criterion.⁵ It will become evident that the same motivations still operate today, and that they do not necessarily cohere with the Church’s mission and her precepts.

GENESIS OF THE “BRAIN DEATH” CRITERION

For millennia, the determination of death has been (and still is, in the great majority of cases) based on the cessation of *all* vital functions. As pointed out by William Arnet, prior to the introduction of “brain death:”

[the] definitions of death found in various medical dictionaries and cyclopedias revolve around one central theme: the cessation of all vital functions of the human body. In formulating the criteria for determining death, these traditional medical definitions do not isolate the function of any one organ; rather, they emphasize the total stoppage of all vital bodily functions, ... as evidenced by absence of heartbeat and respiration ... beyond the possibility of resuscitation. (Arnet 1973, 221–2)

Thus, the traditional conception of death does not attribute primacy to any organ *or*

organ system; rather it “place[s] the definition of death on an integrated basis” (Arnet 1973, 222). In medical parlance, this has been referred to as the traditional cardiopulmonary standard; but this terminology does not fully convey the integrated character of the traditional concept of death (a concept that reflects a holistic understanding of life). In fact, the determination of death according to the traditional standard includes other signs in addition to the cessation of heartbeat and respiration. Regardless of which organ (heart, lungs) or organ system (circulation) stops first, the close link between them is such that when one stops suddenly (e.g., loss of circulation caused by a massive hemorrhage due to a gunshot wound to the abdominal aorta), the other two also stop quasi-simultaneously with it. This is quickly followed by the cessation of functions of other organs, in particular, the brain.

The year 1968 witnessed a revolutionary re-definition of death in biological terms as the Harvard Ad Hoc Committee equated irreversible coma (now known as “brain death”) with death. The opening paragraph of the Harvard Committee’s report states that the main reason for the necessity to redefine death is the burden that patients, deemed to be in irreversible coma, pose to themselves and their families, and that this concern precedes the need to free up beds in the intensive care unit (Harvard Medical School 1968, 337). Obtaining transplantable organs appears to be merely a fortuitous benefit and a peripheral concern. According to respectable medical historians, however, there were three key elements in the genesis of the Harvard report that suggest otherwise (Pernick 1999, 9–11; Giacomini 1997; Rothman 2003, 156–64).

The first was the 1966 international symposium on “Ethics in Medical Progress: With Special Reference to

Transplantation,” sponsored by the Ciba Foundation. As “the [then] burgeoning field of organ transplantation unleashed a strong desire to expand the recipient pool” (Diringer and Wijdicks 2001, 6), there were intense discussions at the symposium on the need for a new paradigm for death, namely, that severely brain-injured patients could be used as “heart-lung preparations” or “living cadavers” to provide more viable kidneys. This idea was enthusiastically supported by Joseph Murray (future member of the Harvard Committee).⁶ There was enough opposition, however, that the conference ended without reaching any consensus.⁷

The movement toward redefining the criteria for death, which had begun with the need for better quality kidneys, took an accelerated turn with heart transplantation. The second important element was, therefore, Christiaan Barnard’s first successful heart transplant in Cape Town on December 3, 1967.⁸ The operation “was hailed throughout the world as a major medical triumph” (Hoffenberg 2001, 1478). As noted by Gregory Pence, because of the reality of heart transplants, “medicine needed a new standard of death, specifically *brain death*, to determine when organs could be removed from a still-living body” (Pence 2004, 44). Thus, shortly after Barnard’s triumph (although the recipient only survived for 18 days), the Harvard Committee was formed on January 4, 1968, because of “the necessity of giving further consideration to the problem of brain death” (Harvard was then a leader in transplantation).⁹ The committee worked swiftly behind closed doors from March through June;¹⁰ and completed its work with the sixth and final draft of its report submitted to the dean on June 25, 1968 (Giacomini 1997, 1474; Wijdicks 2003, 972). The report received immediate publication on August 5, 1968 (Harvard Medical School 1968, 337).

The third element is the language used in the manuscript drafts of the Harvard report, explicitly stating the necessity of “brain-death” for the advancement of transplantation:¹¹

The question before this committee cannot be simply to define brain death. This would not advance the cause of organ transplantation since it would not cope with the essential issue of when the surgical team is authorized—legally, morally, and medically—in removing a vital organ.¹² (Giacomini 1997, 1474)

With increased experience and knowledge and development in the field of transplantation, there is great need for the tissues and organs of the hopelessly comatose in order to restore to health those who are still salvageable.¹³ (Giacomini 1997, 1475)

Thus, both external and internal evidence (including the subsequent remarks of the committee’s chairman¹⁴) strongly suggest that the reasons for the Harvard Committee’s re-definition of death were primarily the pragmatic and utilitarian needs of transplantation to obtain fresh and viable organs. Such utilitarian ethics, which continues to be the driving force in the diagnosis of “brain death” today,¹⁵ contradicts the noble altruistic notion of the “gift of life.” Moreover, the “brain death” standard was advanced without any prior rigorous scientific/clinical studies, even though this is a known requirement in medicine for any procedure prior to its actual application in clinical practice. For the Church to *fully* endorse the neurological standard for the determination of death means that she would have to reconcile the aforementioned utilitarian ethics and lack of scientific validation with her non-utilitarian ethos and moral requirement for rigorous and transparent scientific practice. This, in itself, is a problematic issue, in addition to those issues which arise from the

presuppositions and premises contained in John Paul II’s 2000 address, to which this essay now turns.

READING JOHN PAUL II’S ADDRESS TO THE 18TH INTERNATIONAL CONGRESS OF TRANSPLANTATION

As alluded to in the introduction, the main reason for reading John Paul II’s 2000 address again is to identify the presuppositions and premises that formed the basis of the pope’s remarks with respect to organ transplantation and the “brain death” standard. Once these presuppositions are identified, an in-depth analysis can be carried out to determine if they have been fulfilled (both at the empirical and conceptual levels). Only then can it be said that the pope has given a definitive approval to the use of the neurological standard for the determination of death.

In addition, it is also helpful to read the document from the pope’s perspective. While praising organ transplantation at the start of his address, John Paul II also reminds us that: (i) that “donation of organs [must be] performed in an ethically acceptable manner” (John Paul II 2000, no. 1), and (ii) “what is technically possible is not for that reason admissible” (John Paul II 2000, no. 2). Hence, far more important than any scientific progress is the human being; consequently, the one absolute limit which organ transplantation cannot and must not transgress is the good of the donor, namely his or her life and human dignity. The pope’s opening statements echo the balanced teaching of the *Catechism of the Catholic Church*. The *Catechism*, though praising organ donation as a “noble and meritorious act ... [and] an expression of generous solidarity” (CCC 2003, no. 2296), emphasizes that it must conform to the moral law, precisely because “it is

not morally admissible to bring about the disabling mutilation or death of a human being, even in order to delay the death of other persons” (CCC 2003, no. 2296). Any method for organ harvesting that causes or directly hastens the death of the donor violates both the sacredness of human life and the dignity of the human person. Such a method amounts to euthanasia by “putting an end to the lives of handicapped, sick, or dying persons” (CCC 2003, no. 2277).

From the very start of his address, John Paul II’s approach to organ donation is one of balance and prudential wisdom, which reflects the position of the Church and sets the tone for the remainder of the address. Such a prudential attitude was also present in earlier documents. For instance, in his 1991 address to the Society for Organ Sharing, the pope praised organ transplantation as a new way for man to make a sincere gift of himself in service to life through the donation of his organ(s), a new way for him to fulfill his “constitutive calling to love and communion” (John Paul II 1991, no. 3). At the same time, however, the pope, in his wisdom, could intuit that organ transplantation “is not ... without its dark side” (John Paul II 1991, no. 2) and that there are serious issues (especially those of the ethical order) that need to be confronted. In this light, it can be said that the pope’s insistence in his 2000 address that “*vital organs which occur singly in the body can be removed only after death*, that is, from the body of someone who is certainly dead ... [because] to act otherwise would mean intentionally to cause the death of the donor” (John Paul II 2000, no. 4), was in a way an indirect allusion to the “dark side.” What that dark side is was previously made explicit in his prophetic warning in *Evangelium Vitae*:

Nor can we remain silent in the face of other more furtive, but no less serious and real, forms of euthanasia. These could occur for example when, in order to

increase the availability of organs for transplants, organs are removed without respecting objective and adequate criteria which verify the death of the donor. (John Paul II 1995, no. 15)

In his message to the participants of the conference “The Signs of Death” organized by the Pontifical Academy of Sciences on February 2–3, 2005, John Paul II once again reiterated the balanced position of the Church, stating: “On the one hand, the Church has encouraged the free donation of organs, and on the other hand, she has underlined the ethical conditions for such donation” (John Paul II 2005, no. 2).¹⁶ Since the pope consistently maintained a balanced position toward organ transplantation, his address in 2000 on the controversial issue of “brain death” should be read from *his balanced and prudential perspective*.¹⁷ As presented in the following section, the central part of his discourse (nos. 4 and 5) contains three important presuppositions.

First presupposition

First, the pope’s teaching on death presupposes Christian anthropology, according to which: (a) the human person is the substantial unity of body and soul, and (b) the soul is the life principle (substantial form) of the body. This is the doctrine of the Church as taught in the *Catechism* and formally declared by the Council of Vienne in 1312 (CCC, no. 365). Thus, according to Christian anthropology, “the moment of death for each person consists in the definitive loss of the constitutive unity of body and spirit” (John Paul II 2005, no. 4). The death-event, the separation of the soul from the body, brings about “the total disintegration of [the] unitary and integrated whole” (John Paul II 2005, no. 4) that was the person.

While the event of the body-soul separation cannot be directly identified by

any scientific method, its consequence can be recognized empirically. The separation sets in motion an unstoppable process of somatic disintegration,¹⁸ producing “*biological signs that a person has indeed died*” (John Paul II 2000, no. 4). In other words, as long as somatic integration of the human organism as a whole continues, it is indirect evidence that the soul is still united to the body.¹⁹ The specification of biological parameters indicating that death has occurred “does not fall within the competence of the Church” (Pius XII 1957), however.²⁰ Rather, it pertains to the responsibility and competence of the medical profession to judge and establish, with as much precision as possible, the constellation of signs which can serve as reliable indicators that death has occurred, such that a declaration of death can be made with adequate moral certainty.

In view of John Paul II’s first presupposition, the critical question regarding the neurological standard for the determination of death is thus twofold: (1) does it agree with the Church’s anthropology? and (2) can it qualify as an adequately sound method for ascertaining that the patient has indeed died? The first is at the conceptual/philosophical level while the second belongs to the level of the particular and empirical. John Paul II, therefore, did not elaborate on the latter aspect. In a way, this issue was already touched upon by Pope Pius XII in his address to an international congress of anesthesiologists in 1957. One of the questions submitted to Pius XII was the following: when can a comatose, brain-injured patient “be considered *de facto* or even *de jure* dead” (Pius XII 1957)?

Has death already occurred after grave trauma of the brain, which has provoked deep unconsciousness and central breathing paralysis, *the fatal consequences of which have nevertheless been retarded by artificial respiration?* Or does it occur...

only when there is complete arrest of circulation despite prolonged artificial respiration? (Pius XII 1957; emphasis added)

The aforementioned passage encapsulates the kernel of the “brain death” controversy. One of the most frequent arguments made by “brain death” defenders is that the body of a “brain-dead” individual is not “a body but a corpse, even when it may seem alive because a ventilator masks its death.”²¹ What “masking death” means has never been explicated, however.²² Since life and death are mutually exclusive, and death is the privation of life and refers to the disintegration of the organism, then in what way can death be masked if not by some means of production of life? This is why, in the context of the affirmation that “brain death” is death *simpliciter* (Battro et al. 2007, xxi), the additional claim that “death is camouflaged or masked by the use of [an] artificial instrument” (Battro et al. 2007, xxix) is a very ambitious assertion because it cannot but imply that man-made machinery somehow has the power of producing life. But this is an impossibility because, according to the principle of proportionate causality, whatever is present in an effect must also be in some way in its cause. To assert, as Bishop Sorondo did during the general discussion session of the Pontifical Academy of Sciences (PAS) 2006 conference, that “the ventilator is the principal cause to delay the corpse’s inexorable decomposition process” (Sorondo 2007, 274) is to contradict this very principle, because, as pointed out by Accad (2015, 224), “the ventilator, ... which only manifests a simple power of insufflation, ... has no power to control homeostasis, circulation, digestion, growth, or any other such function, even for a millisecond.” In other words, by the principle of proportionate causes and effects, medical technology, however

advanced it might be, cannot generate the very complex phenomenon of somatic integration which emerges from the numerous interrelated activities of life (e.g., circulation, gas exchange, homeostasis of various types, and metabolic processes to keep the body temperature constant, among others) that are still ongoing in the body of “brain-dead” patients. What has been commonly referred to as the appearance of life (namely, the look and feel of warm and pink flesh) is actually the result of these numerous “behind the scene” interrelated activities of life. In other words, “appearance of life” *is* life, as there cannot be the appearance of life unless there are activities of life ongoing in the subject.

To reiterate, the ventilator cannot mask death and produce the appearance of life in a dead entity because:

1. The ventilator does only two things: (1) expand the lungs in lieu of the intercostal muscles and the diaphragm, and (2) pump oxygenated air into the lungs. By virtue of its design, the ventilator has no role to play in the exchange of oxygen and carbon dioxide (which takes place in the lungs and in all the organs and tissues throughout the body), pushing the blood through the vascular system, or in any of the many vegetative activities that are still ongoing in the body of “brain-dead” patients.
2. To claim that the ventilator can mask death (to cause the appearance of life) in “brain death,” and that “brain death” is death *simpliciter*, is to claim that the ventilator can cause the appearance of life in death *simpliciter*. Traditional death (death as determined by the traditional standard) has been known for millennia as death *simpliciter*. Logically then, if one connects the ventilator to the corpse of a person whose death was determined by the traditional criteria, then one would expect the ventilator to cause what it is

alleged to be capable of, that is, to give the appearance of life in a dead entity. As intuited by common sense, this will not happen, however.

The ventilator and other technological tools are instruments of *life support*, which means that they can only work if there is still some life present in the individual. Consequently, technological prowess cannot mask death.²³ It can only retard the moment of death. Until that very moment, the soul remains united to the body, that is, the patient remains an *integrated whole* even though deeply comatose and completely unresponsive to stimuli. This is why Pius XII responded to the above question as follows: “human life continues for as long as its vital functions ... manifest themselves spontaneously or even with the help of artificial processes” (Pius XII 1957). Pius XII’s answer not only reflects his deep insight on the matter, but also sums up the Church’s belief that the soul is the only and sufficient integrator of the body of the human organism as a whole. The soul manifests itself through multiple, complex, mutually interacting *vital functions*, which are distinct from sensorimotor functions (e.g., brainstem reflexes) and “rational” functions (including consciousness). Pius XII’s statement should help us to understand that, even at the end of life, *in dubio pro vita*.

Second presupposition

The second important premise in John Paul II’s address is that the determination of biological death pertains to the medical community, and not the Church. Therefore, his remarks regarding the neurological standard cannot but rest on the presupposition that the standard has been established by “*clearly determined parameters commonly held* by the international scientific community” (John Paul II 2000,

no. 5; emphasis added). In the context of the discussion, the parameters referred to are the clinical test-criteria used for determining “brain death.” They can only be clearly determined if they have undergone rigorous validation prior to being introduced into clinical practice. This was not performed by the Harvard Committee, however.²⁴ No other large clinical trials have been carried out even though this was recommended by a collaborative study on 503 “brain-dead” patients (National Institutes of Health 1977). With respect to the pope’s requirement that the parameters be commonly held in the medical community worldwide, even “brain death” advocates have to admit that there exists no global consensus (Wij-dicks 2002; Greer et al. 2008, 287),²⁵ but rather a confusion of practice with significant variability found in all areas, including apnea testing.²⁶ Added to these problematic issues are the many inconsistencies inherent in the “brain death” paradigm itself. As will be shown in the following section, the most notable inconsistencies are those between the definition of “brain death” (which requires the irreversible and complete loss of all brain functions) and the empirical evidence, which has repeatedly shown not only: (1) the presence of residual brain functions in “brain dead” individuals, but also (2) that some “brain dead” patients can survive for months and years if they are appropriately supported beyond the acute phase of their injury instead of being sent to surgery for organ harvesting (Halevy and Brody 1993, 520–21; Veatch 2005, 356–58; Truog and Miller 2008, 674).

Medicine is not a science of absolute certainty. Nevertheless, the determination of death, especially when it is soon followed by the removal of viable organs for transplantation, must be as precise as possible. Connected to the aforementioned second presupposition is the pope’s requirement

that the neurological standard be “rigorously applied” (John Paul II 2000, no. 5), to warrant sufficient moral certainty to declare a patient dead. Significant variability in clinical testing for “brain death” is per se contrary to this requirement, however. Furthermore, even if the problem of variability could be corrected by education and training, there would still remain the question of whether the battery of clinical test-criteria, which is constitutive of the “whole brain death” standard, is adequate to establish “the *complete* and *irreversible* cessation of all brain activity” (John Paul II 2000, no. 5). This medical issue will be discussed in the next section.

Third presupposition

The third important presupposition in John Paul II’s address is contained in the third paragraph of number 5, the content of which is connected to that of the first paragraph of the same article. The respective relevant parts read as follows:

For some time certain scientific approaches to ascertaining death have shifted the emphasis from the traditional cardio-respiratory signs to the so-called “*neurological*” criterion. Specifically, this consists in establishing, according to clearly determined parameters commonly held by the international scientific community, the complete and irreversible cessation of all brain activity (in the cerebrum, cerebellum, and brain stem). This is then considered [to be] the sign that the individual organism has lost its integrative capacity. (John Paul II 2000, no. 5.1)

The criterion adopted in more recent times for ascertaining the fact of death, namely the *complete* and *irreversible* cessation of all brain activity, if rigorously applied, does not seem to conflict with the essential elements of a sound anthropology. Therefore a health-worker professionally responsible for ascertaining

death can use these criteria in each individual case as the basis for arriving at that degree of assurance in ethical judgement which moral teaching describes as “moral certainty”. This moral certainty is considered the necessary and sufficient basis for an ethically correct course of action. (John Paul II 2000, no. 5.3)

It seems that the conditional phrase “if rigorously applied” refers only to the clinical test-criteria of the “brain death” standard. The articulation of the first statement of the third paragraph, in which this conditional phrase is found, is rather ambiguous, however, as it is unclear whether the term “criterion” refers to: (1) the application of the “brain death” standard, in which case it would refer to the clinical test-criteria, or (2) to the “brain death” standard itself. The former involves arguments at the medical-empirical level, whereas the latter involves both philosophical and medical arguments. Even with this ambiguity, it is nevertheless clear that the third important presupposition in John Paul II’s address is that the “whole brain death” paradigm coheres with sound anthropology as held and taught by the Church. This presupposition necessarily includes the premise that “brain death” signifies loss of somatic integrity.

As mentioned earlier, the tone of the pope’s address is one of prudential wisdom. It is therefore notable that John Paul II never stated that the neurological standard *is* “the sign that the individual organism has lost its integrative capacity” (John Paul II 2000, no. 5), but rather that it “is ... considered [to be] the sign ...” Readers of the pope’s address who are familiar with the history of “brain death” can easily recognize that here, an implicit reference was being made to the medical and legislative communities by and through which “brain death” has been considered to be the

sign that death has occurred. It was also with the same prudential wisdom that John Paul II (2000, no. 5) stated that “the complete and irreversible cessation of all brain activity, ... *does not seem* to conflict with the essential elements of a sound anthropology” [emphasis added] instead of simply affirming that it “does not conflict with ... sound anthropology.” In other words, the premise, that the “whole brain death” paradigm is not inconsistent with the Church’s anthropology only *seems* to be true, according to the pope’s judgment based on the knowledge that he had around the time of his address.²⁷

To recapitulate, the three important presuppositions upon which the pope’s approval of the neurological standard rests, include:

1. Christian anthropology—this is the pope’s foundational starting point.
2. A twofold presupposition regarding the clinical test-criteria: (a) international consensus and, (b) rigorous application of the clinical tests, which also presupposes that the battery of tests is adequate for determining the irreversible loss of all brain functions.
3. Congruity of the “whole brain death” paradigm with Christian anthropology.

Evidently, both presuppositions (2) and (3) must hold true or be fulfilled if the conclusion is to follow, whether on the individual or general level. On the individual level, the conclusion is about sufficient moral certainty with which a physician could declare a patient dead on the basis of the “brain death standard”; on the general level, the conclusion has to do with the question of the magisterium’s definitive endorsement of “whole brain death.”

With regard to the third premise, the “whole brain death” concept is a twofold thesis: (1) death is “the permanent

cessation of functioning of the organism as a whole” (Bernat, Culver, and Gert 1981, 390), that is, the organism is no longer an integrative unity because “the highly complex interaction of its organ subsystems” comes to an end at death (Bernat, Culver, and Gert 1981, 390); and (2) in the case of humans, the brain is the principle of integration (also known as central somatic integrator in the biophilosophical and medical jargons) “responsible for ... the integration of organ and tissue subsystems by neural and neuroendocrine control of temperature, fluids and electrolytes, nutrition, breathing, circulation, [and] appropriate responses to danger, among others” (Bernat 1984, 48). The first arm of the twofold premise indeed coheres with the Church’s doctrine that the soul is the substantial form of the body, “the spiritual principle which ensures the unity of the individual” (John Paul II 1989, no. 4), such that at death, the soulless body, left to itself, disintegrates. The critical question, then, is: does the second arm of the premise, the absolute supremacy of the brain as the principle of integration, also cohere with Christian anthropology, and concomitantly does it correspond to biological reality?

A BRIEF CONSIDERATION OF THE EMPIRICAL MEDICAL EVIDENCE

John Paul II’s discourse thus leads to two main questions upon which depends his conditional acceptance of the neurological standard. The first question has to do with the adequacy of the clinical test-criteria to establish complete loss of all brain function; the second concerns the practical and conceptual soundness of the rationale of the brain as the principle of integration, which undergirds the “whole brain death” paradigm. In what follows, the discussion will be first on the empirical aspect, and

then on the question of the conceptual soundness.

Are the clinical tests adequate for the determination of “brain death”?

According to the Uniform Determination of Death Act, the legal declaration of death using the “brain-death” standard requires the “irreversible cessation of all functions of the entire brain, including the brainstem” (President’s Commission 1981, 2). Currently, the American Association of Neurology guidelines are the accepted medical standard for the determination of “brain death” (Wijdicks et al. 2010). The guidelines are essentially the same as those in the Harvard report (Harvard Medical School 1968, 337–38), with the difference that the American Association of Neurology considers the electroencephalogram (EEG) as an ancillary test and not as a requirement.²⁸ The required testing consists solely of bedside clinical tests targeting brainstem function.²⁹ The issue of the adequacy of the clinical tests can be addressed in one of two ways: (1) considering only the required tests, or (2) considering both the required and ancillary tests.

Using the first approach, it is self-evident that the required clinical test-criteria are inadequate to establish the “complete and irreversible cessation of all brain activity (in the cerebrum, cerebellum, and brainstem)” (John Paul II 2000, no. 5), since they are only concerned with brainstem reflexes. Hence, there have been repeated reports of “brain-dead” patients with demonstrable genuine electroencephalographic (EEG) activity. In 1971, the Minnesota study on twenty-five cases of “brain death” reported EEG activity in two of nine “brain-dead” patients on whom EEG was performed. The authors of the study simply discarded the evidence by concluding that EEG testing is not needed for establishing “brain

death” (Mohandas and Chou 1971). Similarly, in another study of fifty-six cases of “brain death,” of which eleven had EEG testing, three patients demonstrated persistent EEG activity (Grigg et al. 1987). Furthermore, as pointed out by Halevy and Brody (1993, 521) in their review, there have been reported cases of “brain-dead” patients in whom evoked potentials demonstrated “the functional integrity of the auditory and visual pathways,” indicative of the presence of brainstem function.

It may be argued that the routine inclusion of ancillary tests to detect brain electrical activity or cerebral blood flow would correct the aforescribed inadequacy. Some basic notions of the pathophysiology of brain injury will explain why such will not be the case, however.³⁰ First is the self-protective mechanism of any injured organ (the brain included) to shut down its function. Second is the condition known as global ischemic penumbra during the acute period of severe brain injury, when cerebral blood flow has dropped to 50–80% lower than normal, but still remains above the threshold at which neuronal injury becomes irreversible (Coimbra 2009, 132). Consequently, brain functions are suppressed but the organic vitality of the brain is not yet lost because the level of energy (and thus of oxygen) required for sustaining the vitality of an organ is much lower than that needed for maintaining its function (Astrup, Siesjö, and Symon 1981). The severely depressed brain functions during the penumbra explain EEG isoelectricity and the lack of response to clinical bedside tests.³¹ Similarly, the penumbra-level of cerebral blood flow can fall below the detection threshold of the current available tests for intracranial circulation. Thus, during the acute period of severe brain injury, the lack of brainstem reflexes, even if

accompanied by a flat EEG and absence of intracranial circulation, do not necessarily indicate “brain death.”³² It cannot be excluded that the victim is in fact in the penumbra condition when neurological functions (deemed to be lost) remain recoverable, and the patient’s clinical course remains unpredictable. The “presence of viable brain tissue in the penumbra also explains why the acute clinical presentation of stroke [or other kinds of severe brain injury] is a rather poor predictor of outcome” (Astrup, Siesjö, and Symon 1981, 725). Notably, the penumbra is a precious time-window when prompt aggressive neuro-intensive intervention can significantly improve the outcome of severe brain injury.

Furthermore, there are brain functions not detectable by any of the current tests for “brain death,” namely, the activity of the hypothalamus-pituitary axis that affects other endocrine organs of the body. Persistent neuroendocrine regulation (which accounts for sexual maturation) and secretion of antidiuretic hormone have been reported in patients who met all the criteria of “brain death” (Halevy and Brody 1993, 520; Shewmon 2001, 468).

Faced with the irrefutable evidence of EEG activity, evoked potentials, or neuroendocrine function reported in “brain-dead” patients, Bernat’s school of thought has simply “discard[ed] certain functions of the brain as unimportant or insignificant” (Veatch 2005, 357). Thus, antidiuretic hormone secretion is classified as a non-critical function, and residual EEG activity as coming from some insignificant nests of cortical neurons (Bernat 1992, 25). Such a selective discarding, distinguishing significant from insignificant brain functions is rather arbitrary, however, especially since the concept of “whole brain death” has been defined as the complete and irreversible loss of all brain functions.

Is the theory of the brain as the principle of integration supported by empirical evidence?

According to the rationale of the brain as the principle of integration, it has been asserted that, since “only the brain can direct the entire organism” (President’s Commission 1981, 34), then once a patient is “brain dead,” “even with extraordinary medical care, [somatic] functions cannot be sustained indefinitely – typically, no longer than several days” (President’s Commission 1981, 35), because imminent “cardiac arrest usually occurs within forty-eight to seventy-two hours of brain death in adults” (Soifer and Gelb 1989, 816).³³ There is truth in the aforementioned assertions, in the sense that, since no machine can produce life in a truly dead organism, technological life-support only works if there is still some life (however minimal that may be) in the human organism. Once true death occurs, the process of increasing entropy becomes unstoppable, and no technological intervention can reverse it.³⁴ Thus, if “brain death” is indeed death *simpliciter*, then no amount of technological life support can give the appearance of life, especially not for days, weeks, and months (see the aforementioned discussion on the argument of “masking death”). Medical empirical evidence on “brain-dead” survivors who did not undergo organ harvesting but who instead continued to receive life support, has confirmed neither the purported equivalence of “brain death” as death nor the theory that the brain is the principle of integration, however.

The most persuasive and irrefutable evidence comes from Shewmon’s collection of 175 “brain-dead” patients who survived beyond the aforementioned maximum possible few days (Shewmon 1998a, 135). These cases cannot be dismissed merely as misdiagnoses, for that would imply the

unreliability of “brain-death” declarations (Shewmon 1998b, 1542), or the incompetence of neurologists/neurosurgeons involved in those cases. It would be also unscientific to disregard such survivors as “cell cultures.”³⁵ Admittedly, the number of “chronic brain-death” survivors is small, but the reason for this is because the great majority of “brain-dead” individuals are either quickly taken for organ harvesting or removed from life support. In that sense, the diagnosis of “brain death” has the mark of a self-fulfilling prophecy (Truog and Robinson 2003, 2392). A major textbook of neurology warns against such a self-fulfilling prophecy as follows:

death ... most often is the consequence of decisions to limit life support because poor functional recovery is anticipated. It is increasingly recognized, however, that caregivers [i.e., doctors, nurses, and health-care professionals] tend to underestimate the capacity for recovery from severe brain injury and some fatal outcomes may be the result of self-fulfilling prophecy. (Mayer and Badjatia 2010, 491)

The most important point derived from Shewmon’s data is that “most somatic integrative functions are not brain mediated” (Shewmon 1998a, 138).³⁶ Bernat’s theory of the brain as the principle of integration asserts that the brain controls three categories of critical functions. One of these consists of “integrating functions that assure homeostasis of the organism, including the appropriate physiologic responses to baroreceptors, chemoreceptors, neuroendocrine feedback loops, and similar control systems” (Bernat 1998, 17). These are exactly the properties exhibited by “chronic brain-death” survivors reported by Shewmon and other authors. For example, these patients retained the capacity to develop inflammatory reactions against infections, maintain body temperature, absorb nutrients, get rid of cellular

waste, and undergo sexual maturation. Such diverse activities necessarily involve “homeostasis of a countless variety of mutually interacting ... physiological parameters” between organ systems (Shewmon 2001, 467).³⁷ To date, “brain-death” defenders have not been able to refute Shewmon’s study in a convincing and logical manner.³⁸

For the “brain-death” standard to be relied upon as a sound criterion for the determination of death, the theory of the brain as the principle of integration must correspond to biological reality. The empirical evidence has shown that it does not. This does not mean that the brain has no role to play, however. Its role is “to promote the continued health and function of the body” (Condic 2014, cited in Eberl 2015, 238). Such a function necessarily presupposes an already existing organismic unity, that is, a living organism. In other words, the role of the brain is not so much that of a principle of integration “conferring unity upon the body ... [but, rather that] of enhancing and preserving a somatic unity *already presupposed*” (Shewmon 2001, 464). It is a task somewhat analogous to the supervisory task of the state (or ruler) in the governance of a nation, or the dominion-role which God has conferred to mankind over His creation,³⁹ promoting and harmonizing the various systems or bodies of lower order, but without imperiously controlling or taking over their functions.

In summary, somatic integrative unity does not result from the brain controlling other organs and “micromanaging” them in a top-down fashion; rather, it is a non-localized holistic emergent phenomenon arising from the complex, mutual, and multi-leveled interactions among all the parts of the body. This understanding coheres with the current philosophical and biological understanding about life and organisms (Maturana, Varela, and Beer 1980; Varela 1979; Aguilar 2006).

IS THE RATIONALE OF “THE BRAIN AS PRINCIPLE OF INTEGRATION” CONCEPTUALLY SOUND?

Which of the aforementioned two concepts: (1) the brain as the master organ of somatic integration, or (2) somatic integration as a non-localized emergent phenomenon, coheres with Christian anthropology? The anthropology taught by the Church is grounded in the Aristotelian-Thomistic doctrine ofhylomorphism, according to which a living human person is the substantial unity of body and soul. This means that the human soul, which is subsistent, is united to the material body not as its motor (its mover) but as its substantial form (Aquinas 2010, I, q. 76, a. 1).⁴⁰ As Thomas explains, in the substantial unity of matter and form, the form is the cause of union and causes matter to be in act because the form is itself essentially an act. As such, in the body-soul union, it is the subsistent human soul that communicates *esse* to the body, and therefore, “makes [it] to exist in actuality” (Aquinas 2010, I, q. 76, a. 7). In non-technical language, this means that the soul makes the body what the body is, holding it together and keeping it alive. This rich notion of the soul as substantial form conveys several significant implications, including the following:

1. Precisely because the soul is not united to the body as its motor—which it would be in a Platonic conception of the soul—it is impossible for the unity of body and soul to be mediated by any accidental disposition, because matter (the body) has to receive first the *esse* from the form (its existence actualized by the form) before it can acquire its proper accidental dispositions (Aquinas 2010, I, q. 76, a. 6). Likewise, it is impossible for the body-soul union to be mediated by some intermediate corporeal thing (Aquinas 2010, I, q. 76, a. 7).

2. It follows from the aforementioned that the soul cannot be located “just in the one part of the body by which it moves [and controls] the other parts, ... [but rather], it must exist in the whole body and in each part of the body, ... [because the soul is] the form and actuality not only of the whole [body] but also of each part” (Aquinas 2010, I, q. 76, a. 8).⁴¹ Consequently, when the soul leaves the body upon death, “no part of the body retains its proper function” (Aquinas 2010, I, q. 76, a. 8). In modern scientific language, this means that the organs and parts of the “body” (now a corpse), though they may still retain some viability for a short while (numbered in hours), can no longer function in an integrated manner with one another as they once did in the living body. In other words, the soulless body is unable to hold itself together and succumbs to the unstoppable process of disintegration.⁴²
3. As the substantial form communicating its *esse* to the body, the soul is also the first principle of life of the body, that is,

that by which the body is first and foremost alive. And since life is made manifest by different operations within the different grades of living things, the soul is that by which we perform each of these vital works. ... The soul is that by which we first and foremost assimilate nourishment [*nutrimur*] have sensory cognition [*sentimus*], and move from place to place [*movemur secundum locum*]; and, similarly, the soul is that by which we first and foremost have intellectual understanding [*intelligimus*]. (Aquinas 2010 I, q. 76, a. 1)

The human soul is referred to as the intellectual or rational soul, but it “has within its power whatever the sentient soul of brute animals has and whatever the nutritive soul of plants has” (Aquinas 2010, I, q. 76, a. 3). Consequently, although the soul is incorporeal and thus invisible, its presence can

be deduced from the diverse operations synoptically mentioned in the aforementioned passage—operations which reflect the various powers of the human soul, namely “the vegetative, the sensitive, the appetitive, the locomotion, and the intellectual” (Aquinas 2010, I, q. 78, a. 1). It is the human soul alone, and not any corporeal part (whether the brain, the heart, or any other bodily organ or part), that is the principle and cause of all these powers (Aquinas 2010, I, q. 77, a. 6). Since the actual operations of the powers of the soul involve corporeal organs, it is the human being (the composite body-soul unity) rather than the soul alone, who performs the operations pertaining to each power (Aquinas 2010, I, q. 77, a. 5). Despite the rudimentary biological knowledge of his time, Aquinas recognizes that: (1) the vegetative powers are prior by way of generation to the sensitive powers, and the latter, prior to the intellectual powers (Aquinas 2010, I, q. 77, a. 4); (2) there are three types of vegetative powers: “generative” (to produce offsprings), “augmentative” (growth), and “nutritive,” which maintain the human organism in existence (Aquinas 2010, I, q. 78, a. 2); and (3) vegetative operations involve heat.⁴³ In modern scientific understanding, the “nutritive” power encompasses a whole host of metabolic activities and complex homeostasis of different kinds.

In our day, the notion of soul has fallen by the wayside in the fields of biology and medicine. In order to convey the timeless truth of Aquinas’s teaching on the body-soul hylomorphism mentioned above, it is necessary to “translate” this teaching into concepts familiar to the contemporary scientific/medical mind which understands life in thermodynamic terms. In this thinking, life is the continuous anti-entropic activity maintaining the integrative unity of the organism. Using this modern conception, the very same teaching of Aquinas on hylomorphism can be

paraphrased and reformulated as follows: in addition to its spiritual dimension, the soul, as the substantial form of the body and its first principle of life, must also be the *anti-entropic organizing principle of the body*, organizing and directing all the different parts and organ systems (including their functions and mutual interactions at all levels, that is, from the molecular/microscopic to the macroscopic level) into one single, complex, dynamic, and unified whole that is the body, which grows and changes over the course of the person's lifetime. A similar understanding is expressed by Austriaco from a systems perspective, namely that

the body is a dynamic, complex, and seamlessly integrated network, not of organs nor of cells, but of molecules, including DNA, RNA, lipids, and proteins, connected by reaction pathways that generate shape, mass, energy, and information transfer over the course of a human lifetime.... [It is a] process that has both spatial and temporal manifestations. From the systems perspective, this particular pattern, this organization of the molecules of the human being, would be a manifestation of his immaterial soul. (Austriaco 2003, 304)

The aforementioned passage implies that the anti-entropic organizing principle of the body is present in the whole of the body and in each part of the body (insofar as the part remains part of the whole);⁴⁴ its presence is thus non-localized. This is why Aquinas insisted that the union of the soul to the body is not mediated by any organ in particular. In other words, the soul does not reside in any specific organ, nor is any organ its "vicar" or "stand-in."⁴⁵ As will be discussed in the following section, organs are only the soul's instruments to "move" the body (the word "organ" comes from the Greek word "*organon*" which means a tool or instrument); but it is the soul (the

substantial form) itself that directly informs the body. How exactly the anti-entropic organizing principle of the body works remains a mystery beyond the grasp of the human intellect, simply because this principle (which is none other than the soul) is immaterial; whereas, all human knowledge necessarily begins with sensory perception, followed by abstraction and the formation of concepts. What can be observed, however, are the numerous emergent holistic properties at every level, working together in concert to maintain organismic integrative unity. Such properties range from the multiple anti-entropic somatic integrative functions (such as blood gas exchange at the cellular level, digestion, and complex homeostasis of different kinds) to consciousness.⁴⁶ To put it differently, the non-localized phenomenon of somatic integration is indirect evidence of the non-localized presence and activity of the soul in the body, and therefore, the indirect evidence of its substantial union to the body. To speak of the anti-entropic principle of the body is to speak of its integrative principle; they are two facets of one and the same entity which is the soul. In sum, the sole principle of integration of the body is its substantial form, the soul, and not any corporeal thing. It may be said that the scholastic terminology "to inform the body" corresponds to our modern scientific terminology "to integrate the body."

As mentioned in the previous paragraph, the operations of the soul necessarily involve a corporeal substrate (Aquinas 2010, I, q. 77, a. 5). Organs and body parts are thus employed by the soul as its instruments to "move" the body, that is, to perform diverse functions flowing from the powers of the soul—functions and activities which provide life-energy to the human organism, and which make it possible for the organism to interact with and respond to the external world. Since the

soul is itself the integrator of the body, it has no need for any instrument of integration. The interdependence between the powers of the soul is reflected in the complex interrelationships among the organs and organ systems.

Empirically, it can be intuited that there exists some sort of hierarchy among the different organ systems in that some organs are more vital (and thus also more vulnerable) than others; what that hierarchy is exactly cannot be easily determined, however. At first and for many centuries, primacy was ascribed to the heart: it was held that “the first *motion* of the animal [the organism] is the *motion* of the heart” because “once it stops, the animal dies” (Aquinas *De motu cordis*; emphasis added). In other words, the heart was considered to be “the prime instrument through which the soul’s powers were diffused in the body to move it” (Boyle 2013, 277). Some other authors (e.g., Aristotle, St. Albert the Great, Avicenna) even exalted the primacy of the heart to the point of seeing it as the seat of the soul, or at least as its “deputized organ” (Boyle 2013, 276), that is, its “vicar” or “stand-in.” Aquinas did not fall into the error of exalting any organ (whether heart, lung, or brain), however. This is evident in the following explanatory statement which Aquinas made, when pointing out that the soul-body union is not mediated by any corporeal thing:

The reason why the union of the soul to the body ceases when breath ceases is not that breath is a mediator, but that the disposition by which the body is disposed toward such a union is destroyed. Still, breath is a mediator in effecting movement as the first instrument of motion.⁴⁷ (Aquinas 2010, I, q. 76, a. 7, ad 2)

It is clear from the aforementioned passage that the role of an organ and its functions is strictly that of an “instrument of

motion;” it is not that of a mediator of the soul-body union, and therefore not that of an instrument of integration.

In the earlier writing, *De Motu Cordis*, the heart seems to be the first instrument by which the soul “moves” the body; here, in the *Summa Theologiae*, the lungs (breath) seem to be the first instrument instead. It is thus apparent that: (1) our intellect can recognize that certain organs (corporeal instruments of motion) are of special importance because they “serve to dispose the union of body and soul” (Accad 2016, 2); but (2) we do not know whether or not there exists a ranking among them, and if there were, we do not know which instrument is the first. For centuries, up until the radical paradigm shift to the “brain-death” standard, it was recognized that “three organs—the heart, lungs, and brain—assume special significance” (President’s Commission 1981, 33). Finally, the brain is exalted to the apex of this very same triangle (President’s Commission 1981, 33). But what about the case of a young individual, in whom the brain, heart, and lungs are in perfect working condition, but who suffers a sudden bout of massive uncontrolled hemorrhage (e.g., from a gunshot wound to the abdominal aorta)? Here, the flawed instrument that impedes the operation of the soul is neither the brain, heart, nor the lungs, but instead the blood/circulatory system. In other words, empirical evidence does not support the thesis of a primary organ.

Rather, the evidence suggests that: (1) the soul employs several instruments which, in working closely together and quasi-simultaneously, “serve to dispose the union of body and soul” (Accad 2016, 2); and (2) there is more than one category of instruments. In simple terms, it may be said that there are two broad categories of instruments according to their respective predominant focus, *ad*

intra or *ad extra*. Instruments of the soul with a predominant *ad intra* focus are those concerned with maintaining the internal environment of the human organism in a dynamic homeostatic condition, whereas those with a predominant *ad extra* focus are concerned with the organism's interaction with the external world, which in turn involves sensorimotor and cognitive functions. At the macroscopic level, the heart, lungs, and circulatory system are the most obvious examples of the first category of instruments of the soul, whereas the central nervous system, together with its associated sensory and motor parts of the body, belongs to the second category. But, at a deeper level there are numerous other operations of the soul without which the organism would succumb to biological decay – operations which manifest as complex life processes at the non-macroscopic level, and which keep the organism as an integrative unity, that is, “in a dynamic state of endogenous active opposition to the tendency to increasing entropy” (Shewmon 2012b, 436). This “infrastructure” of invisible operations, together with those macroscopic instruments of the first category, corresponds to what is referred to as the vegetative function of the rational human soul. Vegetative operations are intrinsic to life, and without them, neither sensorimotor nor cognitive function can take place. This was already recognized by Aquinas and his predecessors, that in the order of generation, vegetative powers come first (Aquinas 2010, I, q. 77, a. 4). In other words, the most fundamental organismic integration is integration at the vegetative level. In this regard, only a small part of the brain is involved in the regulation of the organism's internal environment, namely the neuroendocrine system, and those parts of the sympathetic and

parasympathetic systems found in the brainstem (Shewmon 2012b, 447–48).⁴⁸ The battery of clinical tests for “brain death” do not evaluate any of the functions of these systems, however; they only evaluate the patient's (reflex) motor response to various external stimuli. It is thus safe to say that the brain is not the critical instrument employed by the soul for the operations of its vegetative powers—operations that are necessary for maintaining the organism alive. Rather, the brain is the prime instrument for the soul to manifest its higher faculties. In sum, even if the brain is considered as the top organ in the hierarchy of organ systems because of its involvement in the operations of the soul's intellectual powers, its role is not and cannot be that of the principle of integration. That role pertains to the soul alone.

But, according to the philosophical rationale (advanced by Bernat in 1981 and promoted by the 1981 President's Commission) that undergirds the concept of “whole brain death,”

The brain is necessary for the functioning of the organism as a whole. It *integrates*, generates, interrelates, and controls complex bodily activities. (Bernat, Culver, and Gert 1981, 391; emphasis added)

It is primarily the brain that is responsible for the functioning of the organism as a whole: the *integration of organs and tissue subsystems* by neural and neuroendocrine control of temperature, fluids and electrolytes, nutrition, breathing, circulation, [and] appropriate responses to danger, among others. (Bernat 1984, 48; emphasis added)

[The brain] is the irreplaceable, indispensable, complex, structural-functional control system that maintains the health and life of the organism, without which the organism no longer can function as a whole. ... With the loss of the critical system, the organism loses its life-

characterizing processes, especially its anti-entropic capacity. (Bernat 2002, 334)

It is self-evident from the aforementioned three passages (and many similar passages from other scholar-supporters of “whole brain death”), especially when compared to Aquinas’s teaching in *Summa Theologiae* I, q. 76, a. 1 (see the aforementioned quoted passage) that the philosophical rationale of “whole brain death” radically diverges from the Christian anthropology taught and held by the Church. In the latter case, the brain is an organ like any other organ of the body, that is, an instrument of the soul, one that performs functions corresponding to its nature. In the former case, however, the brain itself is made to assume the role of the soul as the “supreme boss,” integrating and controlling the rest of the body.

Such a philosophical paradigm necessarily excludes the soul from consideration. Moreover, it cannot but set up a brain-body dualism, one in which the brain stands apart and over all other organs (including the spinal cord despite the fact that the latter is an integral component of the central nervous system) as if it were “an entity in its own right and not a part of the body” (Shewmon 2001, 475 note 9). The brain-body dualism is reminiscent of the Cartesian mind/body dualism, but with the difference that it takes place within a framework of material monism. That the Church has rejected both Cartesian dualism and material monism further underscores the incompatibility between her anthropology and the dualistic-materialistic philosophy that undergirds the “whole brain death” standard.

Note that this dualistic-materialistic philosophical rationale of the brain as the principle of integration of the body was specifically created in 1981 by Bernat (Bernat, Culver, and Gert, 1981) and promoted by the President’s Commission

(1981) for the justification of “whole brain death,” which the Harvard Committee had introduced in 1968 without any prior thought-out rationale. It then became necessary to explain why “brain death” is death *simpliciter*, why the patient (severely brain-injured and deeply comatose) is said to be dead even though his or her heart is still beating, and his or her flesh warm and pink like other patients in the intensive care unit, along with other signs associated with the living.⁴⁹ The “whole brain death” criterion was thus in need of a philosophical rationale that can answer these specific questions. In the context of these facts, it is rather difficult to think that the association between the “brain death” criterion and the rationale of the brain as the principle of integration is merely something accidental and contingent. This rationale met the above-mentioned need to justify why “brain death” is death—at least for a while, that is, until recently, when mounting irrefutable empirical evidence has repeatedly falsified both the “brain death” criterion and its philosophical rationale (see discussion in the previous section).⁵⁰

For the sake of comparison, one cannot help but note that, with respect to the traditional standard for the determination of death, there has never been a need to advance a philosophical rationale to defend it. The reason for this is simple. As previously mentioned (see the discussion on the genesis of the “brain death” criterion), the traditional standard rests on an integrated basis and requires “the cessation of all vital functions of the human body” (Arnet 1973, 221). Death means loss of integrative unity; this definition is not species specific. Phenomenologically speaking, human death manifests the same signs as the death of any mammalian organism. Thus, in the traditional standard, the signs by which we recognize the death of a person are no different

from those we use to recognize the death of our pet dog or cat, namely, no heart-beat, no respiration, complete inertia (no reaction of any sort like an “inanimate stone”), and a cold, gray complexion;⁵¹ these immediate signs are soon followed by other more definitive signs of death. This is why the traditional standard (which reflects common sense) has no need for its advocates to propose any philosophical rationale to justify it, because the standard itself is already in full accord with the sound Aristotelian-Thomistic anthropology, which the Church has appropriated and taught as her own. It even may be said that this anthropology is the undergirding philosophical rationale of the traditional standard.

It should be noted that the rationale of the brain as the principle of integration is rooted in a mechanistic conception of life (Loeb 1912; Loeb 1916) that is based on Newtonian physics and a Cartesian worldview.⁵² Can it be argued that the “whole brain death” standard, despite its undergirding neo-Cartesian philosophical rationale, is nevertheless not hostile to Christian anthropology? To answer this question, one must examine the American Academy of Neurology guidelines for brain death. The following instructions are part of those guidelines:

Spontaneous movements of the limbs ... can occasionally occur and are more frequent in young adults. These spinal reflexes include rapid flexion in arms, raising of all limbs off the bed, grasping movements, spontaneous jerking of one leg, walking-like movements, and movements of the arms up to the point of reaching the endotracheal tube. ... Profuse sweating, blushing, tachycardia, and sudden increases in blood pressure [which occur at laparotomy], ... [and] muscle stretch reflexes, superficial abdominal reflexes, and Babinski reflexes are of spinal origin and do not invalidate a diagnosis of brain death. (Wijdicks 1995, 1007)

Such reflexes and spontaneous movements, which can be seen twenty-four to seventy-two hours after the diagnosis of “brain death” (Döşemeci et al. 2004, 18), are not infrequent. The frequency of some types of movements can be as high as 75 percent (Saposnik, Basile, and Young 2009, 156).⁵³ The most spectacular series of movements are known as the Lazarus sign, which can occur spontaneously, or more often in response to noxious stimuli, especially the removal of the ventilator during apnea testing (Saposnik, Mauriño, and Bueri 2001, 211). Brain death proponents merely disregard these movements as reflexes coming from the spinal cord and therefore irrelevant (Bernat 1998, 16), as if the spinal cord (which is seamlessly in continuity with the brain) were not part of the central nervous system. The occurrence of reflexes and movements in what is supposed to be a corpse has not been disclosed to the public at large, even though it “has been a source of [cognitive dissonance] and considerable stress” to healthcare personnel involved in the care of “brain-dead” donors (Fox 1993, 233; Youngner et al. 1985).

If “brain death” is death *simpliciter* (Battro et al. 2007, xxi), which means that the soul is no longer in the body, then what is the principle that accounts for: (1) the persistence of the many vegetative functions such as assimilation of nutrients, elimination of waste, as well as the fever reaction to infection and gestation of a fetus, among others; and (2) the occurrence of the aforementioned movements? These operations are the manifestations of two powers (the vegetative and locomotion, respectively), the principle and cause of which can only be the soul (Aquinas 2010, I, q. 77, a. 6; q. 78, a. 1), the substantial form of the body and its first principle of life. This means then that life is still present in the “brain-dead” patient. It is precisely here that the “brain death” standard is hostile to sound anthropology

because it classifies as dead patients who are still alive. Admittedly, these severely ill and deeply comatose patients may be dying; nevertheless, however close to death a person might be, he or she is still alive and not yet dead. Several scholars, in particular Truog, have also shown (albeit without invoking Thomistic metaphysics) that the “whole brain death” paradigm “confuses the fact that a person is dying with the claim that he or she is already dead” (Truog and Robinson 2003, 2392), that is, “it mistakes a prognosis with an outcome” (Truog and Fackler 1992, 1707).

As previously mentioned, John Paul II’s acceptance of the neurological standard as a criterion for the determination of death presupposes (and hence requires) that several prerequisites be fulfilled, the most important of which is the soundness of the premise of the brain as the principle of integration. This premise has to be true for the conclusion (the Pope’s acceptance) to follow. Not only have none of the other prerequisites been fulfilled, but this premise has also shown itself to contradict both the physiological reality and sound Christian anthropology. Furthermore, John Paul II also requested the Pontifical Academy of Sciences to sponsor another conference (the third one) on the same topic of “brain death” which took place on February 3–4, 2005.⁵⁴ This act alone strongly suggests that, from the perspective of the Magisterium, the “brain-death” issue still remains unsettled. Pope Benedict XVI, in his address to the participants of the 2008 international congress organized by the Pontifical Academy of Life, made no mention of the neurological criterion but gave the following admonition instead:

Individual organs cannot be extracted except *ex cadavere*... There cannot be the slightest suspicion of arbitration [arbitrariness] and where certainty has

not been attained the principle of precaution must prevail.... The principal criteria of respect for the life of the donor [donor] must always prevail so that the extraction of organs be performed only in the case of his/her true death.⁵⁵ (Benedict XVI 2008)

TOWARD AN ALTERNATIVE APPROACH FOR POTENTIAL BRAIN-DEAD DONORS

As a corollary of the aforementioned analysis, an important practical question arises: What should be the proper course of action toward patients who are destined to be declared “brain dead”? The loss of brain function, even if it were to be complete, only indicates that the soul no longer has the brain available as its instrument for the mental functioning of the person.⁵⁶ The result is a state of very severe mental disability (Shewmon 2009, 230), perhaps close to death, but it is not death. To equate the death of the patient with the loss of function of one organ amounts to reducing the person to that particular organ alone, in this case, the brain. The patient with severe brain injury destined to be declared “brain dead” is still a human person, and as such, “is deserving of respect and dignity, and at the very least, the right to his or her life”⁵⁷ especially since: (1) the patient’s outcome cannot be predicted in the acute phase of severe brain injury, and (2) new therapeutic modalities (e.g., hypothermia) have much improved the outcome of patients with severe brain injury.⁵⁸

However noble the concept of organ donation is, it cannot justify taking the life of one sick (and dying) person for the sake of saving the lives of several other sick persons. Human life, even that of the moribund person, is of infinite value because it is a gift of God. Thus, what we urgently need today is “the restoration of societal

respect for the [sacredness] of human life—respect that was somehow lost in the acceptance of whole brain death as ... death of the person” (Diamond 2007, 497). Note that this paper is not advocating that severely brain-injured, deeply comatose patients be supported for an indefinite length of time. Medical decision making involves ethical and prudential judgment based on a good knowledge of the medical disorder in question, and the clinical/laboratory assessment of the patient’s clinical course. Such assessment necessarily requires that more than one determination has been performed and that a certain amount of time (days or weeks, not hours) has elapsed.

Since “brain death” cannot be shown to be sound, whether biologically or anthropologically, a more humane approach should be offered to patients with severe brain injury who, instead of being declared “brain dead” within one–two days of admission, should be treated aggressively (with a view to recovery, whether full or partial) and supported through the acute phase of the injury. Admittedly, not every one of them will survive, but then not every one of them will die either. If the patient steadily deteriorates towards imminent death (a trajectory which the powers of medical technology are unable to change),⁵⁹ then he or she should be allowed to die naturally. The approach proposed here will also cohere with Pope Pius XII’s admonition, “human life continues for as long as its vital functions ... manifest themselves spontaneously or even with the help of artificial processes” (Pius XII 1957).

NOTES

1. Scholars on both sides of the “brain death” debate (e.g., James Bernat, Alan Shewmon, and Robert Veatch, among others) have pointed out that the term

“brain death” should be used with quotation marks because of its inherent semantic ambiguity. See Shewmon (1989). The discussion in this essay on “brain death” is concerned only with the “whole brain death” standard, the conceptual rationale of which was advanced by Bernat, Culver, and Gert (1981), appropriated in the same year by the President’s Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (1981), and subsequently adopted worldwide.

2. Jahi McMath, a 13-year-old girl who suffered cardiac arrest secondary to unattended profuse bleeding for five hours after surgery of the tonsils and adenoids, was pronounced “brain dead” (with absence of cerebral blood flow and electrical activity) in December 2013 by three neurologists, including an expert from Stanford University. By October 2014, however, she could move her hands and feet in response to her mother’s verbal requests and also started to menstruate. Further studies showed the following: (1) evidence of brain electrical activity and cerebral blood flow; (2) structural preservation of vast areas of the brain, despite damage to the corpus callosum and pons; and (3) changes in Jahi’s heart rate in response to her mother’s voice. Jahi’s clinical/laboratory data were reviewed by four neurologists (including Shewmon and Calixto Machado), all of whom gave sworn declarations that Jahi is not “brain dead.” See Luce (2015), Matier and Ross (2014), and McGovern (2015). The sworn declarations of the physicians are available online at Pope (2015).
3. Two notable prelates have spoken against “brain death”: the archbishop emeritus of Cologne, Cardinal Joachim Meisner; and the bishop emeritus of Lincoln, Nebraska, Bishop Fabian W. Bruskewitz (see Bruskewitz 2009). In 1996 and 1997, Cardinal Meisner stated officially that “the identification of brain death with the death of the human being is from a Christian viewpoint, at the present state of the debate, no longer defensible. A human being cannot any longer be reduced to his brain function.

Therefore it can neither be said that brain death is death, nor that it is a sign of death. Moreover, brain death is not the time of death.... All deliberations about organ donation therefore have to presuppose that the human being in whom "brain death" has been determined, according to the rules of medical science, is still alive" (Meisner 1996, 1, my translation).

4. The most notable publications in this regard have been from the Pontifical Academy of Sciences (PAS), a consultative body to the Holy See, and not a teaching arm of the Magisterium, which has supported "brain death" since 1985, when the academy organized the first conference on the theme of death. The participants at the 1985 conference consisted only of medical scientists. See Chagas (1986). This proceeding aroused questions and opposition, such that in 1989 the academy organized a second conference on the same theme of death, this time including philosophers and theologians. Despite the raised objections from philosophical and theological quarters, the academy reaffirmed its original position. See *Final Considerations Formulated by the Scientific Participants* (1992). Regarding the objections, see Seifert (1992) and Ols (1992). In 2005, the academy organized a third conference, titled "The Signs of Death," but the publication of what would have been its proceedings was cancelled at the last minute. The academy organized a fourth conference, bearing the same name, "The Signs of Death," in 2006. The invitation to this conference was extended only to "brain-death" proponents. At the last minute, however, two non-pro- "brain-death" scholars, the German philosopher Robert Spaemann and pediatric neurologist Alan Shewmon, were invited at the explicit request of Pope Benedict XVI through his personal secretary. Shewmon could not attend; his paper was read at the conference in his absence. For further details, see the narrative of Mercedes Wilson who was involved in organizing the 2005 conference (Wilson 2009; Shewmon (2012b, 483–87). The first document of the proceedings of the 2006
- PAS conference is a statement in which the academy declares that "brain death is death." See Battro et al. (2007, xxi). Among the signatories of this document are several highly placed prelates, in addition to prominent pro-"brain death" scholars. Originally published with the subtitle "Statement by Neurologists and Others," it was published again in 2008, with a new subtitle "Statement by the Pontifical Academy of Sciences."
5. In particular, the drafts, memos, and work in progress of the Harvard Ad Hoc Committee, known as the "Beecher manuscripts," which reveal the inner workings of the committee and which are preserved at the Francis Countway Library of Medicine at Harvard, are not accessible to the public. These records are made available only to selected people, for example, medical historians such as Mita Giacomini, Martin Pernick, and David Rothman. See Pernick (1999, 27 note 18).
6. Labels such as "heart-lung preparation" or the oxymoron "living cadaver" were used to refer to brain-injured potential donors because at the time of the Ciba symposium, the term "brain death" was not yet invented. Guy Alexander, a Belgian surgeon advanced five neurological criteria for death (to be taken up later by the Harvard Committee) that correspond to the features of the *coma dépassé* described by Mollaret and Goulon (1959, 3–15). Joseph Murray enthusiastically endorsed Alexander's idea, stating, "These criteria are excellent, this is the kind of formulation that we will need before we can approach the legal profession" (Murray 1966, 69 and 73).
7. Notably, David Daub stated the following at the Ciba symposium: "Under the classical definition of death, which should not be lightly discarded, an irreversibly unconscious person whose life depends on a machine is still alive. The doctor may be right to stop the machine and let him die. But until death occurs, interference with his body is illicit: it is not a corpse" (Daube 1966, 191).
8. Although the transplanted heart was obtained from a patient declared brain-dead by a neurosurgeon, Barnard did not remove it until the "electrocardiogram

- had shown no activity for 5 minutes.” His procedure is more akin to what is known today as donation after controlled cardiac death. See Barnard (1967, 1271); Hoffenberg (2001).
9. Dean Robert Ebert, letter of invitation to future members of the Harvard Committee. The invitation reads as follows: “Dr. Beecher’s presentation re-emphasized to me the necessity of giving further consideration to the problem of brain death. With its pioneering interest in organ transplantation, I believe the faculty of the Harvard Medical School is better equipped to elucidate this area than any other single group” (quoted in Giacomini 1997, 1474).
 10. See Giacomini (1997, 1474). The Harvard Committee consisted of 13 members (10 physicians, of which six were pro-brain death). Of note is that no representative of the position of the traditional cardiopulmonary death criteria was invited to participate. Ralph Potter, the theologian member of the committee, later commented that “it was not a deliberative body” (Wijdicks 2003, 975).
 11. The explicit language in the working drafts was toned down by Dean Ebert in the official Harvard report so that organ transplantation, the factor which had all along been the driving force behind the committee’s endeavor, would appear merely as something of secondary importance. This author recognizes that presenting this piece of historical evidence might be construed by some readers as *ad hominem* reasoning. As demonstrated by philosopher Charles Taylor, however, the *ad hominem* mode of practical reasoning is “central to the whole enterprise of moral clarification”; it is especially useful for “the identification of contradiction, the dissipation of confusion, or [for] rescuing from (usually motivated) neglect a consideration whose significance ... cannot [be] contest[ed]” (see Charles Taylor 1995, 37, 53). Similarly, Eerik Lagerpetz has also demonstrated that “there are legitimate uses for *ad hominem* arguments, and they involve a reference to actions of statements of the [other party].” In practical reasoning, such arguments belong to the category of “rules [which] are related to rationality” rather than to the category of logical rules (see Lagerpetz 1995, 369). See also Walton (2008, 190–92), on “non-fallacious *ad hominem* arguments.” In this essay, the purpose of bringing out historical evidence is to demonstrate that the reason, which has undergirded the practice of the “brain death” standard since its introduction, belongs to a type of ethics divergent from the ethos of the Catholic Church. As such, it constitutes an impediment for the Church to integrate “brain death” into her own ethos and mission.
 12. From the conclusion of the first manuscript-draft of the Harvard report in April, 1968.
 13. From a late manuscript-draft of the Harvard report in June 1968.
 14. For instance, the chairman of the Harvard Committee explicitly reiterated the pragmatic need for viable organs in the following statement: “At whatever level we choose to call death, it is an arbitrary decision.... It is best to choose a level where, although the brain is dead, usefulness of other organs is still present” (Beecher and Dorr 1971, 120).
 15. At the 2006 PAS conference, Wijdicks, a leading “brain death” advocate, acknowledged that: “the diagnosis of brain death is driven by whether there is a transplantation programme or whether there are transplantation surgeons. I do not think brain death examination now, in practice, would have much of any meaning if it were not for the sake of transplantation” (Sorondo 2007, 50).
 16. The English version of the document carries a non-descript title of “Letter of John Paul II to the Pontifical Academy of Sciences.” In February 2005, the Holy Father was too ill to preside over the opening of the conference; instead, his message was read in his absence to the participants.
 17. The term “brain death” is not used by the Magisterium, even though it is used by non-magisterial bodies of the Church such as the Pontifical Academy of Sciences.
 18. Some exceptions to the unstoppable somatic decay and putrefaction of the

- body *in toto*: (1) cryopreservation, and (2) divine intervention which keeps the bodies of many saints incorrupt for centuries.
19. The biological notion of “organism as a whole” rests directly on the axiom that the sum is more than its parts. Therefore, it is not a concept that can be defined. Its characteristics can be described, however. Functions which are characteristic of a human organism as a whole—viewed strictly from the biological perspective—include, for example, temperature maintenance, water and electrolyte balance, and immunological homeostasis, among others.
 20. John Paul II reiterated the same idea in his 2000 address, stating, “the Church does not make technical decisions” (John Paul II 2000, no. 5).
 21. This phrase was part of Bishop Sanchez Sorondo’s contribution to the general discussion session at the 2006 PAS conference. See Sorondo (2007, xlvi). See also the subsection “The Camouflaging of Death” in Battro et al. (2007, xxix). The idea of the masking of death by artificial ventilation was promoted by the President’s Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (1981, 33, 35, and 38).
 22. As Accad (2015, 224) pointed out, the ventilator is a life-support measure administered to critically ill patients, with or without severe brain injury. Hence, it is rather improbable that the ventilator could somehow impede the ability of doctors and nurses to recognize loss of integration, specifically in a “brain-dead” patient, all the while retaining that same ability with respect to other (not brain-injured) critically ill patients.
 23. The argument, that the decomposition of the “brain-dead” body (deemed as a mass of unintegrated organs) is being delayed for days, weeks, and months by artificial ventilation, cannot hold either, because to slow down decomposition requires considerable cooling in addition to oxygenated perfusion, in a manner analogous to organ preservation techniques used in transplantation. Even with the current state of the art, the viability of unintegrated organs (in transit from donor to recipients) can be maintained only for a maximum of twenty-four hours in the case of kidneys, and a much shorter time in the case of other organs (see Guibert et al. (2011, 128). Furthermore, if the body of the “brain-dead” person is truly a corpse, then its temperature will quickly drop to the level of the ambient temperature. Maintenance of body temperature is retained in “brain-dead” organ donors, however, even though it may be lower than normal. As pointed out by Bernat, Culver, and Gert (1981, 390), the presence of temperature regulation, the control of which is located in the hypothalamus, is firm proof of the functioning of the organism as a whole. The persistence of temperature control in “brain dead” individuals is one of the many incoherencies of the “brain death” paradigm.
 24. The 1968 Harvard Ad Hoc Committee Report did not include nor refer to any scientific data to support the validity of the clinical test-criteria of the “brain-death” standard. The report contains only one single reference, referring to Pope Pius XII’s allocution to an international group of anesthesiologists in 1957 (Harvard Medical School 1968, 340).
 25. Even at the 2006 PAS conference, the problem of the lack of consensus came up on numerous occasions (Sorondo 2007, xxxi–xxxii, lxiii, 43–8, 99, 176, and 219). For instance, for some of the participants, the presence of hypothalamic function indicates that the patient is not “brain dead,” while for others, this neuroendocrine function of the brain is considered irrelevant. In particular, Bernat mentioned three future goals concerning the doctrine of “brain death,” two of which are concerned with establishing a consensus, stated as follows: (1) “an international consensus on the clinical tests for brain death,” and (2) “a consensus on the role of confirmatory testing in brain death” (Bernat 2007, 176).
 26. For a detailed discussion on the problems with the clinical tests for “brain death,” see Nguyen (2016).
 27. Note that during the years preceding John Paul II’s 2000 address, the

- academic literature was not lacking in scholarly publications pointing out the numerous inconsistencies of the “whole brain death paradigm”; and this, in itself, was an indicator of a lack of consensus about the “brain death” concept. See, for example, Youngner (1992), Halevy and Brody (1993), Veatch (1993), Robert Taylor (1997), and Truog (1997). At the same time, the medical literature was not lacking in reports of patients who met all the criteria of “whole brain death,” but did not undergo organ explantation and continued to live on for months. Some of these cases were “brain dead” pregnant mothers who, with life support, were able to carry their pregnancies to term (see, for instance, Dillon et al. 1982; Heikkinen et al. 1985; Bernstein et al. 1989; and Shewmon 1998b).
28. A comparison between the latest 2010 American Association of Neurology Guidelines for Brain Death Determination and those advanced by the Harvard Committee show that the bedside clinical test-criteria have remained basically unchanged. What has changed is the increased number of possible confirmatory tests; but as ancillary tests, they are optional. The committee initially required EEG testing and stressed its importance; but by the 1970s, the EEG became an ancillary test and was dropped from every “brain-death” protocol being developed in the United States.
 29. The battery of bedside clinical tests required for the determination of “whole brain death” is identical to that performed in the United Kingdom for establishing “brainstem death,” even though these two subtypes of “brain death” differ from one another on the conceptual level.
 30. For additional details on severe brain injury, see Nguyen (2016).
 31. “When CBF [cerebral blood flow] reaches about 20 ml/100 mg/min, EEG isoelectricity occurs” (Patel 2007, S101). In humans, the normal cerebral blood flow averages about 50 mL/100 mg/min. The flow-threshold at which neuronal injury becomes irreversible is around 10 mL/100 mg/min.
 32. Bernat (2004, 162) asserts that “absent intracranial blood flow proves irreversibility” of the loss of all brain functions. Bernat also insisted, during the 2006 PAS conference, that testing for intracranial circulation must be performed during the acute period, “not three or four days, or a week later” (Sorondo 2007, 177). But this acute period is when the patient is most likely in the penumbra condition. Moreover, as Wijdicks pointed out during the same conference, “our experience with cerebral blood flow is still limited with insufficient validation” (Sorondo 2007, 178). The point, as stated succinctly by Shewmon, is that “even tests of cerebral blood flow could be misleading, given that none of the standard “confirmatory” tests for brain death has been validated to possess sufficient sensitivity to reliably distinguish penumbra-level flow from no flow, particularly in the posterior fossa” (Shewmon 2012a, 5).
 33. According to Soifer and Gelb (1989, 816), the “general acceptance of the concept of brain death depended on this close temporal association between brain death and cardiac arrest.”
 34. Machines cannot reverse death; what they can do, however, is to delay the moment of death, and as such they lengthen the process of dying. A dying organism is not dead yet.
 35. Wijdicks and Bernat consider “chronic brain death survivors” as cell cultures (Sorondo 2007, lxxiii). A cell culture lacks *telos*. The interactions of cells in a cell culture do not result in the emergence of an organ and its holistic properties. In contrast, the interactions of the cells of an organ in a living body are directed toward a *telos*; and, likewise, the interaction of the various organs of a system in a living body is also directed to the same *telos*. That *telos* consists basically in an uninterrupted endogenous “fight” against the tendency of increasing entropy, thereby manifesting life and maintaining the integrative unity of the organism. Such a *telos* disappears once death occurs. Furthermore, one of the manifestations of the unstoppable entropic process in a dead body is the proliferation of bacteria in the gastrointestinal

- tract resulting in an accumulation of toxic substances leading to putrefaction and decomposition. This phenomenon is obviously not observed in the survivors with chronic “brain death.”
36. For a detailed discussion, see Shewmon (2001, 467–71).
 37. Shewmon (2001, 467–68) lists a litany of persistent holistic functions found in “brain-dead” survivors.
 38. The empirical evidence is such that Bernat had to admit, albeit not in public but only in private correspondence, that “the integration argument alone is inadequate.... I have struggled to discern what else is important in addition to the integrator theory” [Bernat’s personal correspondence cited in Whetstine (2006, 122)]. Publicly, Bernat and his colleagues simply disregard the litany of integrative functions reported by Shewmon on brain-dead patients, stating: “Oh but we didn’t mean or care about those functions,” cited in Youngner and Arnold (2001, 530).
 39. See Genesis 1.
 40. A substantial form is that which gives *esse simpliciter* such that at its coming, something is said to be generated *simpliciter*; and at its leaving, something is said to be corrupted *simpliciter* (Aquinas 2010, I, q. 76, a. 4). As substantial form united to the body to form a single composite entity (the human being), the human soul, which is also an incorporeal principle that can subsist on its own (Aquinas 2010, I, q. 75, a. 2), communicates the *esse* of its own subsistence to the body. Consequently, “the *esse* that belongs to the whole composite [of body and soul] is also the *esse* of the soul itself” (Aquinas 2010, I, q. 76, a. 1, ad. 5).
 41. The soul is present as a whole in each part of the body. “Whole” must be understood, not as quantitative wholeness since the soul is not divisible, but as wholeness with respect to perfection and essence. Note also, that “whole” does not mean that the soul is in each part of the body with respect to each of the soul’s powers, but rather with respect to the power of each part. Furthermore, the relation of the soul to the whole is *primo et per se* (primarily and essentially), whereas its relation to the parts is *per posterius* (secondary) insofar as they are parts ordained to the whole (Aquinas 2010, I, q. 76, a. 8).
 42. As a result, the once living body that is now a corpse becomes cold (its temperature drops rapidly to the ambient temperature) and gray. Other signs, such as rigor mortis and putrefaction follow later.
 43. This seemingly insignificant fact is actually of fundamental importance, because for a living mammal, to be alive is to resist entropy. To resist entropy involves energy production. The numerous inter-related metabolic activities throughout the body generate heat, and various homeostatic mechanisms are involved to keep the human organism in a dynamic steady state. This includes the maintenance of a constant body temperature, the regulation of which involves both the brainstem and spinal cord (Pia 1986, 8).
 44. In St. Thomas Aquinas’s days, the removal of a vital body part from one organism followed by its insertion into another organism was something unimaginable. We can therefore safely presume that Thomas’s statement about the soul being present in each part of the body refers to the normal situation where the part (or organ system) is an integral part of the original whole. Such a premise would also provide us with a metaphysical understanding of organ rejection, a topic beyond the scope of this paper, however.
 45. A representative (“vicar” or “stand-in”) of a person is needed only when the person him- or herself cannot be present on site, or when he or she no longer has the competence to perform the task in question. In the case of the soul, however, the soul has no need for any organ to be its “vicar” or “stand-in” to do its task of informing the body (integrating the body) because the soul itself is already present and active in the whole body and in each part of the body (Aquinas 2010, I, q. 76, a. 8).
 46. For a detailed discussion on holistic emergent properties, see Shewmon (2001, 459–62).
 47. Aquinas was responding to the following objection: “If something is such

- that when it is taken away, the union of things that had been united is dissolved, then it seems to be a mediator between those things. But when breathing [*spiritu*] ceases, the soul is separated from the body. Therefore, breath, which is a subtle body, is a mediator in the union of the body and the soul” (Aquinas 2010, I, q. 76, a. 7, arg. 2). Thus, if we were to interpret Aquinas’s explanatory response to mean that a corporeal part can serve as the cause of the integration of the other parts of the body, then we would fall into the very error stated in the objection itself.
48. Much of the autonomic nervous system is found in the spinal cord. The latter is an integral part of the central nervous system and in continuity with the rest of the brain; there is no anatomical line of demarcation between the two. For instance, the sympathetic system of the spinal cord continues to control the vascular tone in “brain-dead” patients (see Kita et al. 1993). Likewise, temperature regulation involves not just the brain but also the spinal cord, “with [a] graded control mechanism organized in a cranio-caudal direction from narrow-band to wide-band control” (Pia 1986, 8).
 49. This is the essence of the reasons why the 1981 President’s Commission undertook its study of defining death (see President’s Commission 1981, 3–4). As Bernat (2006, 36) pointed out more than once, the President’s Commission “chose as [its] conceptual foundation the analysis of death that [he] published with [his] Dartmouth colleagues.”
 50. Under the weight of the irrefutable empirical evidence that falsifies the rationale promoted by the 1981 President’s Commission, in 2008, the President’s Council on Bioethics (2008, 50–64) advanced another philosophical rationale, known as the “fundamental vital work” or the “needy mode of being” rationale. Because it has many overt flaws (not discussed here), it has not been invoked by Catholic supporters of “brain death.”
 51. A side-by-side comparison made by Truog and Robinson between: (1) living patients, (2) “brain-dead” patients and, (3) the “bodies” (cadavers) of patients whose death is determined according to the traditional standard, shows that the “brain death” group share many features of the living (such as heart-beating, perfusion, functioning vital organs, capacity of reproducing – none of which is present in the third group). The absence of the capacity for consciousness is the one feature that the “brain death” group shares with the group of traditional death (see Truog and Robinson 2003, 2392, table 1).
 52. Bernat and his colleagues advanced their rationale of the brain as the principle of integration of the body in 1981. It was not until 2006 that Bernat acknowledged Loeb as the source for his theory, however (see Bernat 2006, 38). In the mechanistic approach: (1) organisms are seen as machines, (2) their goal-oriented processes or phenomena (both biological and psychological) are explained in physicochemical laws, and (3) the notion of a central controller is paramount. As such, the mechanistic approach obviates the need to appeal to any extra-physical vital force (e.g., the soul) as the principle of life, which is the principle of somatic integrative unity and growth. It should also be noted that Loeb’s mechanistic theory of life has been supplanted by newer theories which better reflect biological reality, namely the systems perspective of life and the concept of autopoiesis (see Maturana, Varela, and Beer 1980).
 53. The phenomenon of spontaneous movement in “brain death” was mentioned at the 2006 PAS conference as something of frequent occurrence. For instance, Austrian neurologist Lüder Deecke stated that such movements can occur when “the nurse gives an injection or the [blood pressure] cuff is laid on or the [blood] specimen is taken for compatibility [in preparation for organ harvesting]. Then the dead patient can make withdrawing movements, even those that would give points in the Glasgow Coma Scale” (Sorondo 2007, 20).
 54. See note 4.
 55. It is reasonable to think that Benedict XVI, as a non-medical person, used the

- term *cadavere* in its traditional sense and not in the oxymoronic sense of “heart-beating cadaver” (another term to designate a “brain-dead” donor).
56. A diagnostic evaluation only gives a snapshot in time about the condition of the patient at that particular moment. One single determination in the early phase of any severe injury, including severe brain injury, is insufficient to predict whether the patient’s condition will improve or will get worse, let alone to declare that the loss of function of the brain is permanent or irreversible. To determine that something is permanent requires that some extended period of time has elapsed. The case of Jahi McMath is a case in point in this regard (see note 2).
 57. The quoted phrase is from the anonymous reviewer whom I would like to thank for the suggestions to modify the last section of this paper.
 58. For a more detailed discussion on improved outcome in comatose patients with bilateral fixed and dilated pupils, see Nguyen (2016).
 59. “Personal statement of Edmund D. Pellegrino, M.D.,” in President’s Council on Bioethics (2008, 116).
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BIOGRAPHICAL NOTE

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